Revenue Smoothing in an ARIMA Framework: Evidence from the United States*

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Summary. This paper tests Mankiw's [9] revenue-smoothing hypothesis, that the inflation rate moves one-for-one with the marginal tax rate in the long run, using the new average marginal tax rate series constructed by Stephenson [16] and the long-horizon regression approach developed by Fisher and Seater [5]. It reports considerable evidence against revenue-smoothing.

Key words: : Optimal seigniorage, Integration, Long-run derivative

JEL classification: C22, F31

1 Introduction

A crucial implication of Mankiw's [9] revenue-smoothing (or optimal seigniorage) hypothesis is that higher tax rates are associated with higher inflation rates (and nominal interest rates). There have been many attempts to test this hypothesis. For example, Mankiw [9] and Poterba and Rotemberg [14] using the OLS method find support of the hypothesis. However, more general tests (based on the cointegration and/or VAR methodology) by Trehan and Walsh [17], Ghosh [6], Evans and Amey [4], and Serletis and Schorn [15] generally reject revenue smoothing.

The present paper extends the literature by testing whether the inflation rate moves one-for-one with the marginal tax rate in the long run, using the new average marginal tax rate series constructed by Stephenson [16] and the long-horizon regression approach developed by Fisher and Seater [5]. Long-horizon regressions have received a lot of attention in the recent economics and finance literature, because studies based on long-horizon variables seem to find significant results where short-horizon regressions commonly used in economics and finance have failed.

*Serletis gratefully acknowledges support from the Social Sciences and Humanities Research Council of Canada.

In what follows, we provide a brief summary of Mankiw's [9] theory of optimal seigniorage (Section 2) and of the econometric approach developed by Fisher and Seater [5] (Section 3). In Section 4, we discuss the data, investigate the integration properties of the variables, and present the results. The paper closes with a brief summary and conclusion (Section 5).

2 The Theory of Optimal Seigniorage

Following Mankiw [9], let Y be the exogenous level of real output and τ the tax rate on output. The revenue raised by this tax is τY. It is assumed that the government finances expenditure in excess of taxes from seigniorage. Assuming that the demand for money is described by the quantity equation, $M/P = kY$, the real revenue from seigniorage is

$$\frac{\dot{M}}{P} = \frac{\dot{M}}{M}\frac{M}{P} = (\pi + g)kY$$

where π is the inflation rate and g is the growth rate of real output. The total real tax revenue, T, is therefore the sum of the receipts from direct taxation, τY, and seigniorage, $(\pi + g)kY$. That is, $T = \tau Y + (\pi + g)kY$.

The social costs of taxation and inflation are assumed homogenous in output and denoted by $f(\tau)Y$ and $h(\pi)Y$, respectively, where $f' > 0$, $h' > 0$ and $f'' > 0$, $h'' > 0$. The government's goal is to minimize, with respect to τ and π, the expected present value of the social losses

$$E_t \sum_{j=0}^{\infty} \beta^j \left[f(\tau_{t+j}) + h(\pi_{t+j})\right] Y$$

subject to the present value budget constraint

$$\sum_{j=0}^{\infty} \beta^j G_{t+j} + B_t = \sum_{j=0}^{\infty} \beta^j T_{t+j}$$

where G_t is real government expenditure at time t (taken to be exogenous), B_t is real government debt at time t, and β is the real discount factor, assumed constant over time.

The first-order conditions necessary for optimal intertemporal monetary and fiscal policy are (see Mankiw [9])

$$E_t \left[f'(\tau_{t+j})\right] = f'(\tau_t), \tag{1}$$

$$E_t \left[h'(\pi_{t+j})\right] = h'(\pi_t), \tag{2}$$

$$h'(\pi_t) = kf'(\tau_t). \tag{3}$$